

An approach of zirconium oxide/polyethylene glycol nanocomposite film on screen printed carbon electrode and its application in glucose determination

ABSTRACT

An amperometric biosensor for the quantitative measurement of glucose is reported. The biosensor is based on a biocomposite that is homogeneous and easily prepared. This biocomposite is made of polyethylene glycol (PEG), Cetyl trimethylammonium bromide (CTAB), glucose oxidase (GOx), and zirconium oxide (ZrO₂) nanoparticles. Effect of applied potential, pH, nanocomposite layer, ratio of zirconium oxide nanoparticles (ZrO₂) to polyethylene glycol (PEG), concentration of ferrocenecarboxaldehyde (Fc) and concentration of enzyme that governed the analytical performance of the biosensor have been studied. The biosensor was applied to detect glucose with a linear calibration range from 0.1 mM to 12 mM and limit of detection 0.04 mM. The variation coefficient (RSD) for repeatability was 7.5% for ten successive assays while 6.01% ($n = 5$) for reproducibility test demonstrating that the biosensor fabrication process is reproducible. Common interfering compounds on the amperometric response of the sensor were investigated and discussed herein.

Keyword: Biosensor; Polyethylene glycol; Zirconium oxide